Watershed Inventory Data Sheet

Sturgeon Creek Watershed

Date
Investigator
Waterbody Name **Site ID#** _____
Site Reference

Pollutant Source (choose only one, complete section)

1. Debris/Trash | 2. Construction Site Runoff | 3. Stream Crossing | 4. Rill or Gully Erosion

5. Livestock Access | 6. Upland Source | 7. Tile Outlet | 8. Streambank Erosion | 9. Other _____

County	Midland	**Township**		**Section #**	**0.25**	**0.25**
Tract #(s)			**Owner**			
Current precipitation	None	Light	Moderate	Heavy		
Days since last rain	1 or less	2	3 or more	How much?	inches	
Water Color	Clear	Green	Milky	Brown	Very Muddy	Black
Water Odor	None	Musty	Rotten Eggs	Chemical	Oil	Sewage
Stream flow type	Dry	Stagnant	Slow Flow	Rapid Flow		
Average Stream Width	10' or less	11' - 25'	25' - 50'	50' or more		
Average Stream Depth	<1'	1' - 3'	>3'	Don't know		
Riparian Habitat	Trees	Shrubs	Herbaceous plants		Grass	Bare
Buffer/Filter Strip	Y / N	Width	<1'	1' - 3'	3' - 10'	>10'
Land Use (facing u/s)	Left Road	Woodland	Wetland	Idle	Agricultural	Res/Comm
	Right Road	Woodland	Wetland	Idle	Agricultural	Res/Comm

Comments:

SECTION 1. DEBRIS/TRASH/OBSTRUCTIONS

Slight | Moderate | Extensive | Description: _____

SECTION 2. CONSTRUCTION SITE RUNOFF

Location	Left Bank	Right Bank		
Construction type	road	residential	industrial	other
Soil erosion measures	not installed	needs repair	not adequate	
Sedimentation control measures	not installed	needs repair	not adequate	
Extent of erosion/sedimentation	slight	moderate	severe	

SITE ID#

SECTION 3. STREAM CROSSING

Type of Crossing	Bridge	Single Culvert	Double Culvert	Other
Construction material	Concrete	Galvanized	Plastic	Other
Condition	Good	Fair	Poor	
Flow	Clean	> 1/4 full of Sediment	Obstructed	
Road Surface	Paved	Gravel	Unimproved	
Erosion Location	Streambank	Embankment	Culvert outlet	Shoulder/Ditch
Extent of Erosion	Minor	Moderate	Severe	

SECTION 4. RILL, GULLY, OR SURFACE DITCH EROSION

Location	Left Bank	Right Bank				
Average Width		feet	(Top width + Bottom width)/2			
Depth		feet				
Length		feet				
Height of streambank	< 3'	3' - 6'	> 6'			
Land use at location	Road	Woodland	Wetland	Res/Comm	Agricultural	Idle

SECTION 5. LIVESTOCK ACCESS

Location	Left Bank	Right Bank		
Length of erosion	< 10'	10' - 25'	26' - 100'	> 100'
Height of streambank	< 3'	3' - 6'	> 6'	
Vegetation cover	Bare	Sparse vegetation	Stable vegetation	

SECTION 6. UPLAND NUTRIENT SOURCES

Location	Left Bank	Right Bank			
Cropland Erosion/Runoff	Conventional Tillage		Manure Spreading	Plowing perpendicular to stream	
Manure in Stream	None	Some Evident	Extensive Amount		
Manure Storage	Y / N	How far from top of streambank?		feet	
Feedlot Area		acres	Paved	%	
Animal Operation Type	Dairy	Hog	Beef	Other	

SECTION 7. TILE OUTLETS

Location	Left Bank	Right Bank	Erosion	Y / N	
Pipe diameter		inches			
Pipe Material	Plastic	Clay	Metal	Concrete	Other
Height above Stream Bottom	0" - 6"	6" - 12"	12" - 36"	> 36"	
Discharge Color	Clear	Green	Cloudy/Milky	Very Muddy	Black
Discharge Odor	None	Musty	Ammonia/eggs	Chemical/oil	Sewage

SECTION 8. STREAMBANK EROSION

Location	Left Bank		Right Bank	
Length of erosion	< 10'	10' - 25'	26' - 100'	> 100'
Height of streambank	< 3'	3' - 6'	> 6'	
Severity of Erosion	Some Bare Bank	Mostly Bare Bank	Bare bank w/ Rills	Washout
Location of Erosion	Toe	High Water Mark	Top of Bank	Entire Bank

Sturgeon Creek Watershed
Debris

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC1_DT	DT_DESCRIP
907LIN2306	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	3'-10'	N	Agricultural	Res/Comm	Extensive	Some flow blockage. Densely packed small debris.
907LIN2501	Bensch Drain	LIN	25	Clear	None	Slow	10' or less	1'-3'	Shrubs	1'-3'	>10'	Agricultural	Woodland	Extensive	Breached beaver dam. Some flow blockage. Found 3 mussel shells at dam.
907LIN2505	Bensch Drain	LIN	25	Clear	None	Slow	10' or less	<1'	Trees	>10'	N	Woodland	Agricultural	Extensive	Breached beaver dam restricting flow from 10' to 4'. Left bank eroded at dam.
907LIN2506	Bensch Drain	LIN	25	Clear	None	Slow	10' or less	<1'	Shrubs	3'-10'	N	Agricultural	Agricultural	Extensive	Breached beaver dam in bend of stream. Some flow restriction.
9041LIN2301	Dittmar Branch 1	LIN	23	Clear	None	Slow	10' or less	1'-3'	Shrubs	>10'	>10'	Woodland	Woodland	Extensive	Similar to beaver dam but no beaver sign. Blocking some flow. Anchored by 2 fallen trees.
60LAR3003	Newell	LAR	30	Clear	None	Slow	11'-25'	1'-3'	Herbaceous	>10'	>10'	Woodland	Woodland	Extensive	1 anchored log catching other woody debris. Some water backup, more possible.
601LAR2002	Newell Branch 1	LAR	20	Clear	None	Slow	10' or less	<1'	Shrubs	>10'	>10'	Woodland	Woodland	Extensive	Debris causing small (>1') falls. Streambed exposed clay for ~75 feet to confluence w/Newell Drain.
907LIN2301	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	3'-10'	>10'	Res/Comm	Woodland	Moderate	A tree top fell into the ditch. There is no debris accumulation or water blockage.
907LIN2303	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Res/Comm	Woodland	Moderate	Natural sticks and logs accumulating across stream. No water blockage.
907LIN2305	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Woodland	Woodland	Moderate	Three separate areas of debris within 100'. Some debris accumulation, no flow restriction.
904LIN2401	Dittmar	LIN	24	Clear	None	Slow	11'-25'	1'-3'	Shrubs	>10'	>10'	Woodland	Woodland	Moderate	Logs, stumps, tires and lumber forming debris jam. Waterflow does not seem to be impeded.
903HOP2802	Harris Drain	HOP	28	clear	none	stagnant	10' or less	<1'	trees	Y	>10'	Agricultural	Res/Com	moderate	Woody debris behind cattail thicket. 20' long slough on inside of bend, decreases stream width from 3' to 1'.
8872LAR2701	Jacobs Branch 2	LAR	27	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Woodland	Woodland	Moderate	Smaller anchored logs and sticks. Debris in and across stream. Possible water backup.
886MID0501	Lalk	MID	5	Cloudy	None	Slow	10' or less	<1'	Trees	>10'	N	Res/Comm	Woodland	Moderate	3 logs collecting debris. Water backed up by debris. Back-up covered w/ sheen and film.
886MID0502	Lalk	MID	5	Cloudy	None	Slow	10' or less	<1'	Trees	>10'	N	Res/Comm	Woodland	Moderate	A living cedar tree has fallen across the drain and is collecting debris and obstructing flow.
60LAR2903	Newell	LAR	29	Clear	None	Slow	11'-25'	1'-3'	Trees	>10'	>10'	Woodland	Woodland	Moderate	Debris not blocking, but diverting, water flow into left blank causing undercutting & potential eros.
906LIN3601	State Drain	LIN	36	clear	none	slow	10' or less	1'-3'	Shrubs	Y	3'-10'	Commercial	Commercial	moderate	Logs, tires, trash, lots of sand
906MID0609	State Drain	MID	6	clear	none	slow	10' or less	>3'	trees	Y	3'-10'	Residential	Residential	moderate	Logjams and trash, dumping chips on left bank. Water upstream clear. Water at outlet & downstream grey.
906MID0702	State Drain	MID	7	clear	none	slow	10' or less	<1'	trees	Y	>10'	Woodland	Woodland	moderate	3 large logjams @ elbow, almost total flow blockage at furthest one upstream
906MID0703	State Drain	MID	7	clear	none	rapid flow	10' or less	1'-3'	trees	Y	>10'	Wood/Road	Woodland	moderate	Logjam diverting flow and causing erosion around elbow
04MID0606	Sturgeon	MID	6	clear	none	slow	10' or less	1'-3'	trees	10'	3'-10'	Wood/Res	Wood/Res	moderate	old tires and concrete blocks on right bank @50'/some erosion also
04MID0802	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	N	N	Woodland	Woodland	moderate	large dead trees
04MID0817	Sturgeon	MID	8	clear	none	slow	10' or less	1'-3'	trees	Y	>10'	Woodland	Woodland	moderate	Logjam w/ twigs, sediment flowing through spot @ 1-2' wide
04LAR3103	Sturgeon	LAR	31	clear	none	slow	10' or less	1'-3'	trees	Y	>10'	Woodland	Woodland	moderate	Logjam with lots of trash.
04LIN0401	Sturgeon	LIN	4	clear	rotten eggs	slow	25'-50'	1'-3'	trees	Y	>10'	Wetland	Wetland	moderate	Logs, duckweed, trash
907LIN2302	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Woodland	Woodland	Slight	Two logs and some smaller pieces of wood collected across stream. Potential to affect flow
60LAR1701	Newell	LAR	17	Clear	None	Slow	10' or less	1'-3'	Trees	>10'	3'-10'	Woodland	Res/Comm	Slight	Extended length of erosion beginning at confl. w/ Clark Dr. Not all of it is actively eroding but potential is high.
906MID0602	State Drain	MID	6	clear	none	slow	11'-25'	1'-3'	trees	Y	3'-10'	Residential	Residential	slight	Burn pile and debris up to bank, not bad but has gas and oil containers, work with landowners.
04MID0805	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	Y	>10'	Wood/Road	Wood/Res	slight	log accumulation w/ trash on left bank before site 4
60LAR1702	Newell Drain	LAR	17	clear	none	slow	10' or less	<1'	trees			Woodland	Res/Com		The natural logs and sticks in the stream are not blocking the flow but are catching what floats in.
906MID0704	State Drain	MID	7	clear	none	rapid flow	11'-25'	?	trees	Y	>10'	Wood/Road	Woodland		Logjam with trash, bottles, drywall, Styrofoam, etc.

Sturgeon Creek Watershed
Construction Sites

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC2_CONST	CONST_TYPE	EROS_MEAS	SED__MEAS	EXTENT	COMMENTS
903HOP2101	Harris Drain	HOP	21	clear	none	slow flow	10' or less	<1'	shrubs	Y	N	Ag	Res/Com	LB	industrial	not installed	not installed	moderate	Gully along one drain pipe, erosion along another.
04MID0803	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3	trees	Y	>10'	Wood	Wood/Res	RB	res/tennis court	not adequate	old sea wall	moderate	

Sturgeon Creek Watershed
Road/Stream Crossings

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC3_CROSS	MATERIAL	CONDITION	FLOW_RATE	SURFACE	LOCATION	EROS_EXT	COMMENTS
906MID0605	State Drain	MID	6	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Wood/Res	Wood & res	Single culvert	Galvanized	Good	Clean	Paved	All given	Mod-severe	
04MID0806	Sturgeon	MID	8	clear	none	slow	10' or less	1'-3'	trees	N	3'-10'	Woodland/road	Wood/road	Single culvert	concrete	fair	clean	paved	culvert outlet	moderate	culvert outlet/ds eroding culvert w/ incision
888LAR2001	Pluss Drain	LAR	20	clear	none	slow flow	10' or less	<1'	shrubs	N		Residential	Agricultural	single culvert	galvanized	fair	clean	paved	Left streambank	moderate	
8941MIL3201	Boyle Drain North	MIL	32	clear	none	slow flow	10' or less	1'-3'	grass			Res/Com	Res/Com	Double culvert	galvanized	good	clean	paved	shoulder/ditch	moderate	Eroded hole forming on shoulder between 2 culverts. Hole depth almost to top of culverts.
886MID0601	Lalk	MID	6	Clear	None	Slow	10' or less	<1'	Trees	N	N	Res/Comm	Res/Comm	Single Culvert	Concrete	Good	Clean	Paved	Culvert outlet	Moderate	Culvert outflow is at 90 deg. to stream channel. At high water outflow impacts the poorly rip-rapped bank.
907LIN2502	Bensch Drain	LIN	25	Cloudy/Milky	None	Slow	11'-25'	?	Trees	N	>10'	Agricultural	Agricultural	Single Culvert	Galvanized	Good	Clean	Unimproved	Shoulder/Ditch	Moderate	Gully formed from road through shoulder and down bank. Soft roadbed suggests continued erosion.
887LAR3304	Jacobs Drain	LAR	33	clear	none	slow	10' or less	1'-3'	grass	3'-10'	3'-10'	Commercial	Woodland	single culvert	galvanized	fair	clean	paved	Left streambank	moderate	
906LIN3603	State Drain	LIN	36	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Wood/Com	Woodland	Single culvert	Galvanized	Fair	Clean but yellow	Paved	All given	Moderate	
906MID0603	State Drain	MID	6	clear	none	slow	10' or less	1'-3'	LB-grass,	>10'	N	Residential	Residential	Double culvert	Galvanized	Good	Clean	Paved	Embankment	Moderate	Erosion on LB US of crossing and on RB ds from crossing
902HOP3301	McCoy Drain	HOP	33	cloudy/milky	none	slow	10' or less	1'-3'	trees			Woodland	Woodland	single culvert	plastic	good	>1/4 clogged	unimproved	culvert outlet	minor	Major sediment input ds at new culvert, probably from installation. Water too cloudy to see if still eroding.

Sturgeon Creek Watershed
Rill and Gully Erosion

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC4_RG	RG_WIDTH	RG_DEPTH	RG_LENGTH	RG_HEIGHT	COMMENTS
893MIL3201	Whitmer Drain	MIL	32	clear	none	slow flow	10' or less	<1'	trees			Woodland	Woodland	LB	3'	2'	45'	>6'	Large 4' diameter corrugated culvert under road undercut, runoff now below it. Culvert collapsed in middle.
893MIL3301	Whitmer Drain	MIL	33	clear	none	slow flow	10' or less	<1'	grass			Woodland	Woodland	RB	5'	3'	40'	3'-6'	Flowing water present in gully, sediment deposit in drain. Past and current deposition narrowing channel.
893MIL3303	Whitmer Drain	MIL	33	clear	none	slow flow	10' or less	<1'	grass			Res/Commercial	Ag(pasture)	RB	4'	3'	35'	3'-6'	Long gully through bank to pasture. Little current erosion but channel reduced due to sediment.
9031HOP2203	Harris Drain East	HOP	22	clear	none	stagnant	10' or less	<1'	trees	3'-10'	N	Agricultural	Agricultural	LB	4'	4'	35'	>6'	Gully runs length of drain pipe plus 10'. Head of drain is a stand pipe. Major sediment source.
9031HOP2103	Harris Drain East	HOP	21	clear	none	stagnant	10' or less	<1'	trees	3'-10'	3'-10'	Agricultural	Agricultural	LB	4'	4'	35'	>6'	Gully runs length of drain pipe plus 10'. Head of drain is a stand pipe. Major sediment source.
893MIL3302	Whitmer Drain	MIL	33	clear	none	slow flow	10' or less	<1'	shrubs			Woodland	Woodland	RB	2'	3'	30'	3'-6'	Similar to downstream site. Gully narrower & more erosion. Sediment deposition narrowing channel.
909LIN3504	State Drain	LIN	35	clear	none	slow	10' or less	<1'	LB-shrubs, RB-grass	>10'	N	Woodland	Agricultural	RB	2'	3'	25' (into field)	3'-6'	
9031HOP2202	Harris Drain East	HOP	22	clear	none	slow flow	10' or less	<1'	shrubs	3'-10'	3'-10'	Agricultural	Woodland	LB	3'	4'	25'	3'-6'	Gully runs full length of drain pipe. Major sediment load which impedes flow at low levels.
9031HOP2102	Harris Drain East	HOP	21	clear	none	slow flow	10' or less	<1'	shrubs	3'-10'	3'-10'	Agricultural	Woodland	LB	3'	4'	25'	3'-6'	Gully runs full length of drain pipe. Major sediment load which impedes flow at low levels.
909LIN3502	State Drain	LIN	35	clear	none	slow	10' or less	<1'	grass	3'-10'	N	Agricultural	Agricultural	RB	4'	3'	25'	>6'	
895MIL3002	Morris Drain	Mills	30	clear	none	slow	10' or less	<1'	trees	Y	Y	Woodland	Woodland	LB	5'	3'	20'	3'-6'	Seepage under bank from surrounding woodland is eroding the bank.
901HOP1402	Weaver Drain	Hope	14	clear	none	slow	10' or less	<1'	shrubs	1'-3'	1'-3'	Agricultural	Agricultural	RB	1'	1'	20'	3'-6'	Erosion forming long narrow gully through bank and buffer to plowed field. Large sediment input.
8941MIL2901	Boyle Drain North	MIL	29	clear	none	slow flow	10' or less	<1'	shrubs			Woodland	Woodland	LB	3'	4'	15'	3'-6'	Seepage from upland source flowing under path and eroding bank.
902HOP2802	McCoy Drain	Hope	28	clear	none	slow	10' or less	<1'	herbaceous plants	>10'	>10'	Agricultural	Agricultural	LB	5'	1'	15'	3'-6'	Shallow & wide gully. Owner added loose soil to top of gully, adding to large sediment input.
888LAR2002	Pluss Drain	LAR	20	clear	none	slow flow	10' or less	<1'	grass	>10'	N	Idle	Agricultural	RB	2'	4'	15'	>6'	Gully dug in field to drain. Severe sediment input.
889LAR1603	Pluss Drain Branch 2	LAR	16	clear	none	slow	10' or less	<1'	RB-trees, LB-grass	>10'	N	Residential	Woodland	RB	4'	4'	15'	>6'	
8941MIL2902	Boyle Drain North	MIL	29	clear	none	slow flow	10' or less	<1'	herbaceous plants	Y	Y	Idle	Idle	RB	2'	3'	15'	>6'	Water runoff from farm track forming gully.
605LAR1601	Newell Branch	LAR	16	clear	none	slow	10' or less	<1'	herbaceous plants	N	N	Woodland	Agricultural	RB	5'	4'	12'	3'-6'	Wide gully from crop field through bank. Sediment deposition narrows stream width from 4'-6'
902HOP2803	McCoy Drain	Hope	28	clear	none	slow	10' or less	<1'	herbaceous plants	>10'	>10'	Agricultural	Res/Comm	LB	3'	3'	12'	3'-6'	Same as last. Owner adding loose soil to top of gully adding to sediment input.
902HOP2801	McCoy Drain	Hope	28	clear	none	slow	10' or less	<1'	herbaceous plants	>10'	>10'	Agricultural	Agricultural	LB	2'	1'	10'	3'-6'	Old animal burrow? Top of bank intact, erosion through bank, large hole behind bank, high sediment input.
909LIN3503	State Drain	LIN	35	clear	none	slow	10' or less	<1'	shrubs	3'-10'	N	Agricultural	Agricultural	RB	4'	3'	10'	>6'	
907LIN2304	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Shrubs	>10'	>10'	Woodland	Woodland	Left Bank	2	2	25	3'-6'	Gully formed along washed out tile. 4" ceramic tile still in place.
908LIN2501	Beck	Lin	25	Clear	None	Slow	10' or less	<1'	Herbaceous	>10'	>10'	Woodland	Woodland	Right	2	3	20	3'-6'	Gully meanders back through bank into woods. Erosion appears to be old. Heavy sediment deposition.
908LIN2502	Beck	Lin	25	Clear	None	Slow	10' or less	<1'	Herbaceous	>10'	>10'	Woodland	Woodland	Right	5	3	20	3'-6'	Old gully, no apparent erosion recently. Very heavy sediment deposition.
8872LAR2702	Jacobs Branch 2	Lar	27	Clear	None	Slow	10' or less	<1'	Trees	>10'	N	Woodland	Res/Comm	Right	3	2	15	3'-6'	Gully forms from runoff from a cleared area in a housing development.
9081LIN3601	Beck Branch 1	Lin	36	Clear	None	Slow	10' or less	<1'	Shrubs	N	>10'	Agricultural	Idle	Right	3	3	15	>6'	Possible failed drain, cut a gully through the bank. No current erosion but very large amt of sediment.
887LAR3301	Jacobs Drain	LAR	33	clear	none	slow	10' or less	<1'	some trees	N		Agricultural	Agricultural	RB	4'	3'	10'	3'-6'	Erosion from field drain, tried to stabilize with pieces of concrete.
909LIN3501	State Drain	LIN	35	clear	none	slow	10' or less	<1'	shrubs	3'-10'	N	Agricultural	Agricultural	RB	3'	2-3'	8'	>6'	

Sturgeon Creek Watershed
Tile Outlets

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC7_TOLOC	EROS	DIAMETER	MATERIAL	HEIGHT	WA_COLOR	DIS_ODOR	COMMENTS
60LAR1704	Newell Drain	LAR	17	clear	none	slow	10' or less	<1'	trees			Res/Com	Res/Comm	RB	N	1"	plastic	0"-6"	black and milky	none	Discharge is discoloring the bank for @6" and leaving a flaky black deposit for @12".
60LAR2002	Newell	LAR	20	Clear	None	Stagnant	10' or less	<1'	Grass	3'-10'	>10'	Res/Comm	Idle	Right	Y	4	Plastic	6"-12"	Clear	None	Most erosion & sediment deposition coming from ditch along N side of Monroe Rd. Flow under one of the 4 culverts blocked.
893LAR0501	Whitmer Drain	LAR	5	clear	none	slow flow	10' or less	<1'	shrubs			Woodland	Woodland	RB	Y	6"	metal	12"-36"	clear	none	Discharge eroded lower bank @5'. Sediment input mod. @2'X3' dark surface foam @10' below tile. 125' woodland then pasture.
896LIN0202	Clark Drain	LIN	2	clear	none	slow flow	10' or less	<1'	herbaceous	3'-10'	N	Agricultural	Agricultural	RB	Y	8"	metal	12"-36"	clear	none	Pipe was installed to carry water elsewhere but is broken and is dumping water at head of drain.
901HOP2701	Weaver Drain	HOP	27	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Agricultural	Agricultural	LB	Y	?	?	12"-36"	clear	none	no tile seen but good flow coming from end of 20' gully
8962LIN0202	Clark	LIN	2	Clear	None	Slow	10' or less	<1'	Herbaceous	3'-10'	3'-10'	Agricultural	Agricultural	Right	Y	8	Metal	12"-36"	Clear	None	Pipe was installed to carry water elsewhere but has broken and it is dumping water at head of drain.
60LAR1703	Newell Drain	LAR	17	clear	none	slow	10' or less	<1'	trees			Idle	Idle	LB	Y	4"	plastic	0"-6"	clear	none	Tile outlet is @10' from water's edge. Discharge is forming a gully and depositing sediment.
892LIN1203	Boyle Drain	LIN	12	clear	none	rapid flow	10' or less	1'-3'	trees			Woodland	Woodland	LB	Y	4"	plastic	0"-6"	clear	none	2 tiles w/in 6' of each other each forming their own 12' long gully. Active erosion and soil deposition.
60LAR2001	Newell	LAR	20	Clear	None	Slow	10' or less	<1'	Trees	N	3'-10'	Res/Comm	Agricultural	Left	Y	12	Concrete	0"-6"	Clear	None	Tile from auto junkyard depositing eroded sediment into drain.
907LIN2504	Bensch Drain	LIN	25	Cloudy/Milky	None	Slow	10' or less	<1'	Shrubs	3'-10'	>10'	Agricultural	Woodland	Right Bank	Y	3	Metal	0"-6"	Clear	None	A fairly large amount of sediment deposition. This site is across and slightly upstream from 907LIN2503.
892LAR0602	Boyle Drain	LAR	6	clear	none	slow flow	10' or less	1'-3'	herbaceous	1'-3'	1'-3'	Agricultural	Agricultural	LB	Y	5"	clay	>36"	clear	none	Tile outlet eroded back @15' from stream forming a 3' wide gully.
908LIN3602	Beck	LIN	36	Clear	None	Slow	11'-25'	<1'	Shrubs	N	>10'	Res/Comm	Woodland	Left	N	24	Concrete	0"-6"	Clear	None	Oily sheen on water below and slightly above tile outlet.
04MID0807	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	N	N	Road	Woodland	LB		48"	Concrete	>36"	clear	none	Broken in two pieces. Originally one? No discharge.
889LAR1601	Pluss Drain Branch 2	LAR	16	clear	none	slow	10' or less	<1'	RB-trees, LB-grass	>10'	N	Residential	Woodland	LB		buried	metal	>36"	clear	none	Settled "rust" orange colored sediment, @ 3 " deep and 5' long to drain.
901HOP2702	Weaver Drain	HOP	27	cloudy/milky	none	slow	10' or less	1'-3'	trees	Y		Woodland	Woodland	RB	Y	4"	metal	0"-6"	cloudy/milky	none	Some erosion above tile but cloudy discharge coming from runoff through pipe.
907LIN2307	Bensch Drain	LIN	23	Clear	None	Slow	10' or less	<1'	Trees	1'-3'	>10'	Agricultural	Res/Comm	Right Bank	N	24	Concrete	0"-6"	Cloudy/Milky	None	Algae bloom below tile. Slight foam at tile mouth. Draining residential development.
906MID0607	State Drain	MID	6	clear	none	slow	10' or less	1'-3'	trees	3'-10'	3'-10'	Wood/Res	Wood/Res	RB	Y		concrete	12"-36"	clear	none	Orange residue (iron algae) settled in bottom of pipe, extends out of mouth of pipe into drain
906HOM0102	State Drain	HOM	1	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Idle	Res	LB	Y	12"	plastic	6"-12"	clear	none	Eroding in front of and quite a distance behind pipe.
906LIN3601	State Drain	LIN	36	clear	none	slow	10' or less	1'-3'	Shrubs, some trees	3'-10'	N	Com	Com	LB	N	12"	clay	6"-12"	clear	none	Lots of sand.
906MID0609	State Drain	MID	6	clear	none	slow	10' or less	>3'	trees	3'-10'	N	Res	Res	LB	Y	2'	concrete	0-6" (mo	cloudy/milky	none	Water us is clear. Water at outlet and ds is grey.
906MID0703	State Drain	MID	7	clear	none	rapid flow	10' or less	1'-3'	trees	>10'	>10'	Wood/Res	Wood	LB	Y	2'	concrete	6"-12"	clear	none	Added this site after rewalking.
04MID0606	Sturgeon	MID	6	clear	none	slow	10' or less	1'-3'	trees	>10'	3'-10'	Wood/Res	Wood/Res	LB		12"	Metal	>36"	clear	none	Draining at back of pipe
04MID0801	Sturgeon	MID	8	cloudy/milky	none	slow	25'-50'	1'-3'	trees	N	N	Res		RB							Need to revisit

Sturgeon Creek Watershed
Streambank Erosion

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC8_SELOC	SE_LENGTH	SE_HEIGHT	SEVERITY	EROSION	COMMENTS
04MID0816	Sturgeon	MID	8	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB and RB	26'-100'	>6'	Washout	Entire Bank	Severe on LB
04LAR3102	Sturgeon	LAR	31	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Idle	Woodland	LB	26'-100'	>6'	Washout	Entire Bank	Trench through bank also. Former wetland drain by developer?
04MID0602	Sturgeon	MID	6	clear	none	slow	11'-25'	1'-3'	trees	>10'	N	Res	Wood & res	LB	26-100'	>6'	Washout	Entire Bank	
04MID0603	Sturgeon	MID	6	clear	none	slow	11'-25'	1'-3'	trees	>10'	N	Wood/Res	Wood & res	RB	26-100'	>6'	Washout	Entire Bank	
04MID0604	Sturgeon	MID	6	clear	musty	slow	11'-25'	>3'	trees	>10'	N	Wood/Res	Woodland	LB	26-100'	>6'	Some washout, mostly bare	Entire Bank	(another just us at Elev 587 deg, N 43 deg 38.798' W 84 deg 16.287')
04MID0808	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	>10'		Woodland/road	Woodland	LB	26'-100'	>6'	Some washout, mostly bare	Entire Bank	wants to be gully
895MIL3001	Morris Drain	MIL	30	clear	none	slow	10' or less	<1'	grass	Y	Y	Woodland	Woodland	LB and RB	26'-100'	>6'	Bare bank w/ rills	toe	Exposed sandy bank w/ rills adding sediment to drain.
8942MIL2901	Boyle Drain Head	MIL	29	clear	none	slow flow	10' or less	<1'	grass			Res/Com	Res/Comm	RB	<10'	3'-6'	mostly bare bank	entire bank	In residential area under small footbridge. Eroding at bend in ditch.
901HOP2301	Weaver Drain	HOP	23	clear	none	rapid	10' or less	<1'	shrubs	Y		Woodland	Woodland	LB	<10'	3'-6'	mostly bare bank	entire bank	Seepage coming from woodland under "road" is eroding the bank-no culvert
04MID0608	Sturgeon	MID	6	clear	none	slow	11'-25'	>3'	trees	>10'	N	Res	Wood & res	LB	>100'	>6'	Mostly Bare Bank	Entire Bank	
04MID0810	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	>10'	>10'	Woodland	Wood & res	RB	>100'	>6'	Mostly bare bank	Entire Bank	Various locations, seawalls falling in, one location w/ erosion in front of outlet. Old rubber erosion control falling in also.
04MID0813	Sturgeon	MID	8	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB and RB	>100'	3'-6'	Mostly bare bank	Entire Bank	
887LAR3303	Jacobs Drain	LAR	33	clear	none	slow	10' or less	<1'	grass	>10'	N	Idle	Agricultural	LB and RB	>100'	>6'	Mostly bare bank	Entire bank	
886MID0602	Lalk	MID	6	Clear	None	Slow	10' or less	<1'	Trees	N	>10'	Res/Comm	Wetland	Both	>100'	<3'	Mostly Bare Bank	Entire Bank	Both banks are highly eroded along most of the length from Sturgeon Rd. to Sturgeon Cr.
892LAR0601	Boyle Drain	LAR	6	clear	none	slow	10' or less	1'-3'	herbaceous	Y	Y			RB	10'-25'	>6'	mostly bare bank	Entire bank	Water diverted around a clump of vegetation is impacting and eroding the bank.
894LAR0601	Boyle Drain	LAR	6	clear	none	slow flow	10' or less	1'-3'	herbaceous	Y	Y	Idle/Res/Com		RB	10'-25'	>6'	mostly bare bank	entire bank	Water diverted around a clump of vegetation and s impacting and eroding the bank.
9031HOP2201	Harris Drain East	HOP	22	clear	none	stagnant	10' or less	<1'	trees	3'-10'	3'-10'	Wood/Ag	Woodland	RB	10'-25'	>6'	Mostly bare bank	Entire bank	
906MID0705	State Drain	MID	7	clear us, cloudy ds	none	slow	10' or less	<1'	trees	1'-3'	1'-3'	Road	Road	RB	10'-25'	>6'	Mostly bare bank	Entire bank	
601LAR2001	Newell Branch 1	LAR	20	Clear	None	Slow	10' or less	<1'	Shrubs	>10'	>10'	Woodland	Woodland	Left	10'-25'	3'-6'	Mostly Bare Bank	Entire Bank	In outside bend in stream. Bank is sloughing.
8961LIN0103	McPhillips	LIN	1	Clear	None	Slow	10' or less	<1'	Herbaceous	1'-3'	>10'	Agricultural	Agricultural	Right	10'-25'	>6'	Mostly Bare Bank	Entire Bank	
9031HOP2101	Harris Drain East	HOP	21	clear	none	stagnant	10' or less	<1'	trees	3'-10'	3'-10'	Wood/Ag	Woodland	RB	10'-25'	>6'	Mostly bare bank	Entire bank	
904LIN2403	Dittmar	LIN	24	Clear	None	Slow	11'-25'	1'-3'	Trees	>10'	>10'	Woodland	Woodland	Left	10'-25'	3'-6'	Mostly Bare Bank	Entire Bank	Bank eroded back ~10' across from last site. There is also a ruptured earthen dam across stream.
04MID0804	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	>10'	>10'	Wood/Road	Wood & res	LB	26'-100'	3'-6'	Mostly Bare Bank	Entire Bank	
04LAR3101	Sturgeon	LAR	31	clear	none	slow	11'-25'	1'-3'	trees	>10'	N	Woodland	Wood/Road	RB	26'-100'	>6'	Mostly bare bank	Entire Bank	
04LAR3104	Sturgeon	LAR	31	clear	none	slow	11'-25'	1'-3'	trees	>10'		Woodland	Residential	RB	26'-100'	3'-6'	Mostly bare bank	Entire Bank	Mobile home park, turf within 15' of creek.
889LAR1602	Pluss Drain Br 2	LAR	16	clear	none	slow	10' or less	<1'	RB-trees, LB-grass	>10'	N	Residential	Woodland	LB and RB	26'-100'	>6'	Mostly bare bank	Entire bank	LB is worse than RB.
04MID0601	Sturgeon	MID	6	clear	none	slow	10' or less	1'-3'	trees	3'-10'	>10'	Res/Comm/Rd	Woodland	LB	26-100'	3-6'	Mostly Bare Bank	Entire Bank	
04MID0607	Sturgeon	MID	6	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Wood/Res	Wood & res	LB	26-100'	>6'	Mostly Bare Bank	Entire Bank	
901HOP1401	Weaver Drain	HOP	14	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB	10'-25'	3'-6'	mostly bare bank	high water mark	
892LIN1201	Boyle Drain	LIN	12	clear	none	rapid flow	10' or less	1'-3'	trees			Woodland	Woodland	RB	>100'	>6'	mostly bare bank	toe	Extended length of erosion beginning at confluence with Clark Dr. Not all of it is actively eroding but potential is high.
60LAR2901	Newell	LAR	29	Clear	None	Slow	10' or less	D/K	Trees	>10'	>10'	Woodland	Woodland	Left	10'-25'	>6'	Mostly Bare Bank	Toe	Most of the bank, from the toe up 3/4 of the way to the top is eroding. The erosion is on an outside bend in the stream.
8871LAR2802	Jacobs	LAR	28	Clear	None	Rapid	10' or less	<1'	Trees	>10'	1'-3'	Woodland	Res/Comm	Left	10'-25'	3'-6'	Mostly Bare Bank	Toe	Rapid flow from falls is directed against bank causing it to erode.
8871LAR2803	Jacobs	LAR	28	Clear	None	Rapid	10' or less	<1'	Trees	N	3'-10'	Res/Comm	Woodland	Right	10'-25'	>6'	Mostly Bare Bank	Toe	Swiftly flowing stream is eating away at bank, especially at higher flows.
60LAR2902	Newell	LAR	29	Clear	None	Slow	11'-25'	1'-3'	Trees	>10'	>10'	Woodland	Woodland	Right	26'-100'	>6'	Mostly Bare Bank	Toe	In outside bend, bank is trying to stabilize but there is some seepage which is adding to erosion.
04MID0812	Sturgeon	MID	1	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Wood/Res	Woodland	LB and RB	>100'	3'-6'	Mostly bare, some washout	Entire Bank	Bet. 0811 & 0812 eroded, mostly rb closer to 0812. Debris contributing? Trees down, owner throwing concrete & grass.
04MID0814	Sturgeon	MID	8	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB and RB	26'-100'	>6'	Mostly bare, some washout	Entire Bank	LB height @4', RB more severe
04MID0815	Sturgeon	MID	8	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB and RB	26'-100'	3'-6'	Mostly bare, some washout	Entire Bank	Mostly on LB
04MID0609	Sturgeon	MID	6	clear	none	slow	11'-25'	1'-3'	trees	Y		Woodland	Comm-road	RB	>100'	>6'	Mostly bare, some washout	Entire Bank	
904LIN2402	Dittmar	LIN	24	Clear	None	Slow	11'-25'	1'-3'	Trees	>10'	>10'	Woodland	Woodland	Right	26'-100'	3'-6'	Some Bare Bank	Toe	The bank has eroded back ~20' at a bend in the drain.
889LAR1604	Pluss Drain Br 2	LAR	16	clear	none	slow	10' or less	<1'	grass	N		Agricultural	Idle/some wood	LB	>100'	>6'	Some bare bank	Top of bank	Mowed for hunting?
04MID0809	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	>10'	>10'	Woodland	Wood & res	LB and RB	>100'	>6'	Mostly bare, little washout	Entire Bank	Footbridge here contributing?
887LAR3302	Jacobs Drain	LAR	33	clear	none	slow	10' or less	<1'	grass	1'-3'	1'-3'	Agricultural	Agricultural	LB and RB	>100'	>6'	Mostly bare bank	Entire bank	Gully at fence line, holding pond behind mall on rb w/in 30' of drain.
04MID0811	Sturgeon	MID	8	cloudy/milky	none	slow	11'-25'	>3'	trees	>10'	>10'	Woodland	Woodland	LB	26'-100"	3'-6'	washout	High water mark	Near road, Some bare bank, washout behind concrete on culvert

Sturgeon Creek Watershed
Streambank Erosion

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	SEC8_SELOC	SE_LENGTH	SE_HEIGHT	SEVERITY	EROSION	COMMENTS
902HOP2701	McCoy Drain	Hope	27	clear	none	stagnant	10' or less	<1'	trees	>10'	>10'	Residential/Com	Agricultural	RB	<10'	<3'	washout	entire bank	Bank eroded back through entire riparian area into buffer strip.
903HOP2801	Harris Drain	HOP	28	clear	none	slow flow	10' or less	<1'	shrubs	1'-3'	N	Agricultural	Agricultural						
906MID0701	State Drain	MID	7	clear	none	slow	10' or less	<1'	trees	>10'	>10'	Woodland	Woodland						Trees falling in due to severity of erosion
04LIN0401	Sturgeon	LIN	4	clear	rotten eggs	slow	25'-50'	1'-3'	trees	>10'	>10'	Wetland	Wetland	LB and RB	10'-25'	3'-6'	Mostly bare bank	Entire bank	
906HOM0103	State Drain	HOM	1	clear	none	slow	10' or less	<1'	trees	>10'	>10'	Woodland	Wood/Com	RB	10'-25'	3'-6'	Mostly bare bank	Entire bank	
906LIN3602	State Drain	LIN	36	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Woodland	Woodland	LB	10'-25'	3'-6'	Some bare bank	Entire bank	
903HOP2802	Harris Drain	HOP	28	clear	none	stagnant	10' or less	<1'	trees	>10'	>10'	Agricultural	Res/Com	LB	10'-25'	>6'	Some bare bank	Top of Bank	20' long slough on inside of bend. Sediment decreases stream width from 3' to 1'.
906MID0602	State Drain	MID	6	clear	none	slow	11'-25'	1'-3'	trees	3'-10'	3'-10'	Residential	Residential	LB and RB	26'-100"	3'-6'	Some bare bank	Entire bank	
906MID0604	State Drain	MID	6	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Residential	Woodland	LB and RB	26'-100'	3'-6'	Mostly bare bank with some w	Entire bank	
906MID0606	State Drain	MID	6	clear	none	slow	11'-25'	1'-3'	trees	>10'	>10'	Wood/Res	Wood/Res	LB and RB	26'-100'	3'-6'	Mostly bare bank with some w	Entire bank	Behind the red house is a drain where the erosion is most severe. Water is turbid here at drain. This whole stretch of the state drain between Moorland and Dublin is bad.
906MID0610	State Drain	MID	7	very muddy	none	rapid flow	10' or less	1'-3' before d	trees	>10'	>10'	Wood/Res	Wood/Res	LB	26'-100'	3'-6'	Washout	Entire bank	
906MID0704	State Drain	MID	7	clear	none	rapid flow	11'-25'	don't know	trees	>10'	>10'	Wood/Res	Woodland	LB	26'-100'	>6'	Washout	Entire bank	

Sturgeon Creek Watershed
Algae

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	ALGAE	COMMENTS
60LAR0402	Newell Drain	LAR	4	clear	none	slow	10' or less	<1'	herbaceous plants	N	N	Ag.(pasture)	Ag. (crop)	SEVERE	Algae bloom: Major bloom
893LAR0502	Whitmer Drain	LAR	5	clear	none	slow flow	11'-25'	don't know	shrubs			Woodland	Woodland	SEVERE	Surface film: A lg amt duckweed & surface film behind log floating on surface above culvert. Film is similar to foam at site 01.
906HOM0104	State Drain	HOM	1	clear	none	slow	10' or less	1'-3'	LB-trees, RB-plants	>10'	N	Woodland	Commercial	SEVERE	Algae bloom. US at Price rs cross is res pond full of algae, level w/turf, no buffer & very close to drain, overflow likely during heavy rains, tire in drain.
907LIN2308	Bensch Drain	LIN	23		None	Slow	10' or less	<1'	Trees	1'-3'	-	Agricultural	Res/Comm	SEVERE	Sporadic and light to heavy density growths of duckweed and some algae. Starts just above Stark Road and extends for about 300 yards
442LIN3101	Hahn	LIN	31	Cloudy/Milky	None	Slow	10' or less	1'-3'	Herbaceous	N	N	Agricultural	Agricultural	PRESENT	A thick algae bloom starts just below a dry private side ditch. Both sides of drain are heavily used pasture.
442MID0601	Hahn	Mid	6	Clear	None	Slow	10' or less	<1'	Shrubs	N	>10'	Res/Comm	Woodland	PRESENT	A large amount of red/orange algae coming from a tile on the right side of the drain. Little in main drain.
60LAR0801	Newell	LAR	8	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Woodland	Woodland	PRESENT	Sporadic algal bloom in Newell Dr. above & below Miller Dr. & above Mier Rd. Tile outlet eroded back ~15' from stream forming a 3' wide gully.
60LAR3002	Newell	LAR	30	Clear	None	Slow	10' or less	1'-3'	Herbaceous	>10'	>10'	Res/Comm	Woodland	PRESENT	A moderate algae bloom present at and below a building. No obvious tile or other source.
8876LAR2701	Jacobs Branch 3	LAR	27	Clear	None	Slow	10' or less	<1'	Herbaceous	N	N	Res/Comm	Agricultural	PRESENT	Extensive Red/orange algae in stream. Almost continuous from here to bend in stream (~1/4 mi.)
890LAR0901	Miller	LAR	9	Clear	None	Slow	10' or less	<1'	Herbaceous	N	N	Agricultural	Res/Comm	PRESENT	A fairly dense algae bloom begins just below Eastman Rd. and extends for about 200 yds.
8961LIN0101	McPhillips	LIN	1	Clear	None	Slow	10' or less	<1'	Herbaceous	N	N	Agricultural	Res/Comm	PRESENT	As the drain runs along Dublin Rd, the stream has a large algae bloom. There is no obvious source for the nutrient load.
9041LIN1501	Dittmar Branch 1	LIN	15	Clear	None	Slow	11'-25'	1'-3'	Shrubs	N	>10'	Res/Comm	Woodland	PRESENT	Moderate algae/duckweed bloom in drain below large artificial ponds in housing development.
904LIN1402	Dittmar	LIN	14	Clear	None	Slow	10' or less	1'-3'	Grass	N	N	Res/Comm	Res/Comm	PRESENT	There is an algae bloom along and slightly downstream from a residence with a pond. The pond also has algae.
908LIN2503	Beck	LIN	25	Clear	None	Slow	10' or less	<1'	Trees	N	1'-3'	Res/Comm	Woodland	PRESENT	Fairly large algae and duckweed bloom begins just downstream from tile which runs along a residential/commercial property.

Sturgeon Creek Watershed
Other

SITE_ID	WATBODY	TWP	SEC	COLOR	WA_ODOR	FLOW_TYPE	ST_WIDTH	ST_DEPTH	HABITAT	BUF_LF	BUF_RT	LU_LEFT	LU_RIGHT	COMMENTS
904LIN1001	Dittmar	LIN	10	clear	none	slow	11'-25'	don't know	herbaceous plants			Wetland	Wetland	Algae bloom extends between 2 beaver dams. Sporadic large thick clumps.
904LIN1002	Dittmar	LIN	10	clear	none	slow	11'-25'	1'-3'	trees			Wetland	Wetland	Sporadic large clumps of algae extend below lowest of 4 beaver dams.
904LIN1401	Dittmar	LIN	14	Clear	None	Slow	10' or less	<1'	Trees	>10'	>10'	Woodland	Woodland	Oily sheen in side channel near rd crossing, water in side channel not flowing & no evidence of sheen in the drain.
8961LIN0102	McPhillips	LIN	1	Clear	None	Slow	10' or less	<1'	Grass	>10'	N	Agricultural	Agricultural	At least 3 deer carcasses were placed in stream. No algae seen downstream.
8871LAR2801	Jacobs	LAR	28	Clear	None	Rapid	10' or less	<1'	Trees	>10'	1'-3'	Woodland	Res/Comm	A 4' waterfall has formed, possibly due to erosion caused by two opposing side channels. Streambed below falls is exposed clay.
8871LAR2804	Jacobs	LAR	28	Clear	None	Rapid	10' or less	<1'	Shrubs	>10'	>10'	Idle	Woodland	A beaver dam was built then breached. Residual wide channel remains above dam.
8871LAR3201	Jacobs	LAR	32	Clear	None	Slow	10' or less	<1'	Herbaceous	N	N	Res/Comm	Res/Comm	Large sediment deposit just below culvert from fairgrounds.
8871LAR3302	Jacobs	LAR	28	Clear	None	Slow	11'-25'	<1'	Herbaceous	3'-10'	>10'	Idle	Wetland	A small beaver dam is holding water back just below confluence of Jacobs Dr. and Jacobs Branch #1.
60LAR0401	Newell Drain	LAR	4	clear	none	stagnant	no channel	no channel	trees	N	N	Res/Comm	Woodland	Heavily impacted & obstructed by driving heavy equipment over drain, the floodplain used as a dump area-channel dissipates.
60LAR3001	Newell	LAR	30	Clear	None	Slow	10' or less	1'-3'	Shrubs	>10'	>10'	Woodland	Woodland	Sediment deposition is blocking 2/3 of the bridge under Sturgeon Rd. Source possibly ditch on N side of drain, E side of road.
60LAR3004	Newell	LAR	30	Clear	None	Slow	11'-25'	<1'	Trees	>10'	>10'	Woodland	Woodland	Two areas of instream sediment deposition below a deeper, slower area. Upstream erosion may be the cause.
906HOM0101	State Drain	HOM	1	clear	none	slow	10' or less	<1'	Herb., some trees	>10'	>10'	Res/Com	Residential	"Hole" dug through bank. No flow but heavy erosion. Former wetland?
906HOM0102	State Drain	HOM	1	clear	none	slow	10' or less	1'-3'	trees	>10'	>10'	Idle	Residential	Eroding in front of and quite a distance behind pipe.
906LIN2701	State Drain	LIN	27	clear	none	slow	10' or less	<1'	trees	>10'	>10'	Wood/Res	Woodland	Log sidewalls falling in. Erosion control?
907LIN2503	Bensch Drain	LIN	25	Cloudy/Milky	None	Slow	10' or less	<1'	Shrubs	3'-10'	>10'	Agricultural	Woodland	A dressed deer carcass was placed in the stream. It is mostly on the bank but partially in water.
907LIN3601	Bensch Drain	LIN	36	Clear	None	Slow	10' or less	<1'	Trees	N	>10'	Res/Comm	Woodland	Large amount of exposed sediment along bank and washed into stream. No obvious source but it is below a large industrial site.
908LIN3601	Beck	LIN	36	Clear	None	Slow	10' or less	<1'	Herbaceous	N	N	Res/Comm	Res/Comm	Ditch from industrial site depositing lg amt sediment into stream. Ditch bermed closed at drain but without tile, water is backed up & seeping through.
891LAR0701	Visgar Drain	LAR	7	clear	none	slow	10' or less	<1'	grass	N	N	Res/Comm	Res/Comm	Entire Visgar Drain-intermittent & sporadic algae bloom, runs through new housing devel, pasture, cropland and residential, headwaters at a home w/lg pond.
892LIN1202	Boyle Drain	LIN	12	clear	none	rapid flow	10' or less	1'-3'	herbaceous plants			Woodland	Woodland	Possibly seep from flooded upland. Some sediment input.

Watershed Survey Data Sheet

Date: Time:
Waterbody Name: County: Station #:
Location: Township: Sec T R ¼ ¼
Investigator: Lat: Long:
Coordinate Determination Method (check the one that applies):
___ GPS ___ GPS w/ DBR ___ Digital mapping software ___ Topographic map ___ Other (describe _____)
Map Scale (if known _____)

PHYSICAL HABITAT

BACKGROUND INFORMATION - pg. 18

Event Conditions noted at site	None	Light	Moderate	Heavy
Days since Rain	≤ 1	2	≥3	Unknown
Water Temp./D.O./pH *				
Water Color	Clear	Gray	Brown	Black / Green
Waterbody Type-u/s	Stream	Lake	Impd	Wetland
Waterbody Type-d/s	Stream	Lake	Impd	Wetland
Stream Width (ft.)	<10	10-25	25-50	>50
Avg. Stream Depth (ft.)	<1	1-3	>3	Unknown
Water Velocity (ft./sec) *				
Stream Flow Type	Dry	Stagnant	L	M / H

PHYSICAL APPEARANCE - pg. 20

	U/S (Check all that apply)		D/S (Check all that apply)	
Aquatic Plants	Present	Abundant	Present	Abundant
Floating Algae	Present	Abundant	Present	Abundant
Filamentous Algae	Present	Abundant	Present	Abundant
Bacterial Sheen/Slimes	Present	Abundant	Present	Abundant
Turbidity	Present	Abundant	Present	Abundant
Oil Sheen	Present	Abundant	Present	Abundant
Foam	Present	Abundant	Present	Abundant
Trash	Present	Abundant	Present	Abundant

SUBSTRATE (add to 100%) – pg. 22

	U/S (%)	D/S (%)
Boulder – 10 in. diam.		
Cobble/Gravel –10 to .08 in. diam.		
Sand – coarse grain		
Silt/Detritus/Muck - fine grain/organic matter		
Hardpan/Bedrock – solid clay/rock surface		
Artificial – manmade		
Unknown		

INSTREAM COVER – pg. 23

	U/S (X)	D/S (X)
Undercut Banks		
Overhanging Veg.		
Deep Pools		
Boulders		
Aquatic Plants		
Logs or Woody Debris		

RIVER MORPHOLOGY – pg. 23

	U/S			D/S		
Riffle	Present		Abundant	Present		Abundant
Pool	Present		Abundant	Present		Abundant
Channel	Natr	Recv	Maintnd	Natr	Recv	Maintnd
Designated Drain	?	Y	N	?	Y	N

Highest Water Mark (ft.)	?	<1	1-3	3-5	5-10	>10

STREAM CORRIDOR – pg. 26

	U/S				D/S			
Riparian Veg. Width ft.(L)	< 10	10-30	30-100	>100	< 10	10-30	30-100	>100
Riparian Veg. Width ft.(R)	< 10	10-30	30-100	>100	< 10	10-30	30-100	>100
Bank Erosion	0	L	M	H	0	L	M	H
Streamside Land Cover	B	G	S	T	B	G	S	T
Stream Canopy %	<25		25-50	> 50	<25		25-50	> 50

Stream Cross Section

Adjacent Land Uses

Wetlands	L	R	L	R
Shrub or Old Field	L	R	L	R
Forest	L	R	L	R
Pasture	L	R	L	R
Crop Land	L	R	L	R
Animal Feeding Operation	L	R	L	R
Maintained Lawns/Parks	L	R	L	R
Impervious Surfaces	L	R	L	R
Disturbed Ground	L	R	L	R
No Vegetation	L	R	L	R

NOTE: * - Optional data item

Date: **Watershed Survey Data Sheet (pg. 2)** Station #:

ROAD CROSSING INFORMATION								
Crossing Type	Bridge	____ Round Culvert(s)	____ Box Culvert(s)	____ Arch Culvert(s)	Other:			
Road Surface	Paved	Gravel	Sand	Clay	Grass	Other:		
Road Ownership	MDOT	County	USFS	MDNR	Municipal	Priv/Corp	Unknown	Other:
Culvert Problems	Poor Alignment	Inadequate Armoring	Impounding Water	Obstructed	Structural Integrity	Other:		
Perched Culvert	< 3"	3-12"	> 12"	Plunge Pool				
Crossing Erosion	Crossing Embankment	Road Approaches	Road Ditches					

POTENTIAL SOURCES (Severity: S – slight; M – moderate; H – high) – pg. 28

	U/S			D/S				U/S			D/S		
Crop Related Sources	S	M	H	S	M	H	Land Disposal	S	M	H	S	M	H
Grazing Related Sources	S	M	H	S	M	H	On-site Wastewater Systems	S	M	H	S	M	H
Intensive Animal Feeding Operations	S	M	H	S	M	H	Silviculture (Forestry NPS)	S	M	H	S	M	H
Highway/Road/Bridge Maintenance and Runoff (Transportation NPS)	S	M	H	S	M	H	Resource Extraction (Mining NPS)	S	M	H	S	M	H
Channelization	S	M	H	S	M	H	Recreational/Tourism Activities (general)	S	M	H	S	M	H
Dredging	S	M	H	S	M	H	• Golf Courses	S	M	H	S	M	H
Removal of Riparian Vegetation	S	M	H	S	M	H	• Marinas/Recr. Boating (water releases)	S	M	H	S	M	H
Bank and Shoreline Erosion/ Modification/Destruction	S	M	H	S	M	H	• Marinas/Recr. Boating (bank or shoreline erosion)	S	M	H	S	M	H
Flow Regulation/ Modification (Hydrology)	S	M	H	S	M	H	Debris in Water	S	M	H	S	M	H
Upstream Impoundment	S	M	H	S	M	H	Industrial Pt. Source	S	M	H	S	M	H
Construction:Highway/Road /Bridge/Culvert	S	M	H	S	M	H	Municipal Pt. Source	S	M	H	S	M	H
Construction: Land Development	S	M	H	S	M	H	Natural Sources	S	M	H	S	M	H
Urban Runoff (Residential/ Urban NPS)	S	M	H	S	M	H	Source(s) Unknown	S	M	H	S	M	H

SITE SUMMARY INFORMATION – pg. 33			
SURVEY DIRECTION	N/A	U/S	D/S
SITE SIMILARITY	?	Y	N
OVERALL SITE RANKING	Good	Fair	Poor
FOLLOW UP	L	M	H

COMMENTS: _____

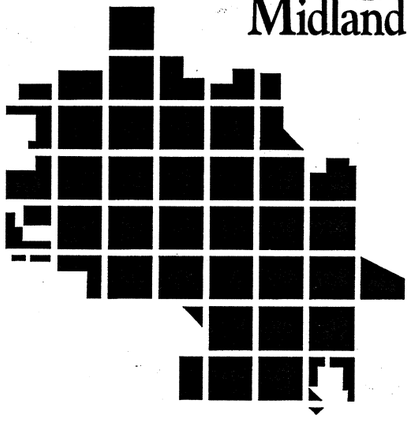
_____

_____

NOTE: * - Optional data item

CITY OF

Midland

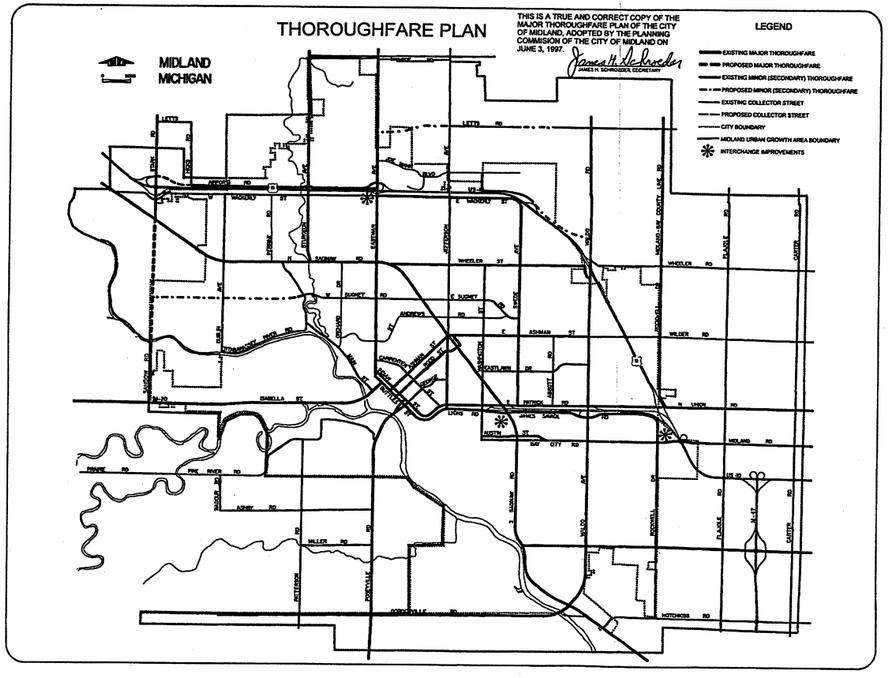


MASTER PLAN

(Comprehensive Development Plan)

1997-2007 & Beyond

THOROUGHFARE PLAN



THOROUGHFARE PLAN

The Thoroughfare Plan identifies improvements the street system requires to serve future growth. The Plan classifies streets according to their primary function, either moving traffic from one location to another or providing access to property adjoining the road. The categories and the function of each are as follows:

Expressway
This designation is for limited-access highway facilities whose primary function is carrying long-distance traffic between regions of the State. No access to adjoining property is provided. US-10, which extends around the north and east sides of the City, is the only thoroughfare in this category.

Major Thoroughfare
The primary role of major thoroughfares is moving traffic through the City or area. Providing access to adjoining property is of minor importance. Characteristics include: high speeds, high traffic volumes, long roadway length, multiple lanes, turning lanes at intersections, no on-street parking, and limited use of traffic control devices. Major thoroughfare traffic is given preference by traffic signalization.

Minor (Secondary) Thoroughfare
Moving traffic within the City remains the more important of the two functions for this category of roadway, but access to adjoining property is of higher importance than for major thoroughfares. Additionally, traffic signalization is more frequent, operating speeds are lower, and access design stresses minimizing the number of driveways.

Collector Street
Collector streets serve the dual function of mobility and access. They collect traffic from a network of local streets and link the local street network to streets of higher classification, while also providing access to adjoining properties.

Local Access Street
Providing access to adjoining property is the major function of local streets. These streets are designed to carry little or no through traffic. (These streets are not shown on the Plan.)

The Thoroughfare Plan includes the following modifications to the City's major street system:

I. New east-west connection from Waldo Avenue to Jefferson Avenue, north of US-10, utilizing a part of the existing Joseph Drive.

II. New major arterial street extending south from Saginaw Road near Stark Road to M-20 (Isabella Street).

III. Extension of Letts Road between Jefferson Avenue and Eastman Avenue, to improve east/west circulation in the area.

IV. Extension of Sugnet Road west from W. Main Street to Dublin Avenue.

V. More direct connection between the west end of Airport Road at Hicks Road and Stark Road near the US-10 interchange.

VI. Reconstruction of the Bay City Road/US-10 interchange.

Issues

Need for improvements to the Eastman Avenue/US-10 interchange. Expansion of the Waldo Avenue/US-10 interchange from a partial to a full interchange. The expansion is projected to occur further in the future, beyond the time frame of this plan.

INTRODUCTION

The City of Midland's Master Plan represents a guide for the City's future physical development. Enhancing Midland as a place to live, work, shop, play, and avoid the problems of uncontrolled development are its primary goals. The plan is based on anticipated future growth. The plan, with goals and policies, has been developed to accommodate and manage the anticipated growth in an effective and efficient manner.

FUTURE POPULATION GROWTH AND LAND NEEDS

Population Growth

The 1990 Census reports the City's population as 38,053, about a 2.2% growth factor over the 1980 population of 37,250. The July 1994 U.S. Census estimates for the City of Midland show a population of 39,568, which is a 4.0% growth factor over the 1990 figures. The Census does not, however, consider population gained from annexations. With the population of areas annexed into the City since the 1990 Census, the Planning Department estimates a current 1997 population of 40,300.

Assuming a conservative 0.15% growth rate per year between now and the year 2000, and adding populations from anticipated areas of annexation, the projected population for the year 2000 would be 40,500, and 42,150 for the year 2010. This would be a low estimate, compared to the growth of the City of Midland over the past six years. Assuming a 5% growth rate per decade and adding population from potential annexations would estimate a population of 41,320 by the year 2000 and 43,390 by the year 2010.

Land Needs

While there is a relationship between the amount of land needed for future development and the anticipated population growth, this is not always a direct relationship, particularly for nonresidential land use categories. The proposed plan provides for ample lands to be set aside for all types of development. This provides alternatives for land owners and developers in locating future development.

The Land Use Plan provides for considerable General Commercial land north of US-10 between Jefferson and Eastman. This area has become the focal point for much of the commercial development taking place in the City. However, the downtown area still is to be maintained for specialty kinds of commercial and service establishments.

Industrial lands are located primarily in the southeast part of the City. This places industrial development down wind from most of the residential neighborhoods in the community. Lands for other kinds of industrial development under controlled conditions are also provided.

Future modifications to the plan may be necessary to accommodate changes in the manner and direction that development is proceeding. The planning process is one of continuing evaluation of growth trends and community needs.

COMMUNITY GOALS AND POLICIES

Identification of community goals regarding the future is an important component of the comprehensive planning process. Goal statements aid in defining a common purpose and direction for the community. The following goals were established by the Planning Commission to guide the development of this Plan. Each goal statement is followed by a brief discussion of policies and/or actions intended to assist in achieving the goal.

1. GOAL: MAINTAIN A COMPACT DEVELOPMENT PATTERN.

The City of Midland currently benefits from a relatively compact development pattern when compared to many other communities its size in Michigan and around the country. Benefits of this type of development pattern are many. They include:

- Increased proximity and shorter driving distances between residences and places of work
- More efficient use of public infrastructure, resulting in lower costs
- Preservation of natural resources, open space and agricultural land
- Preservation of adequate land for open space in close proximity to residential neighborhoods

The compact pattern of growth found in the City has developed, in part, due to the lack of potable water and suitable means for disposing of sanitary sewage in areas not served by public utilities. The policy of the City of Midland of not extending municipal utilities to areas within a defined perimeter of the City, unless annexed to the City (the Midland Urban Growth Area or MUGA policy), has also assisted in maintaining this efficient growth pattern.

Policy/Action: The City should continue its use of utility services to help shape the future pattern of growth in the City to a compact urban form, including requiring annexation as a condition of utility service extensions within the Urban Growth Area boundary. The use of intergovernmental agreements providing for sharing of tax base with adjoining townships can be a mutually beneficial means of resolving conflicts over municipal boundary changes, and should be pursued in the future.

Policy/Action: The land-use pattern in the City should provide for contiguity between future growth and existing development. The Land Use Map in this Plan is intended to maintain a compact urban form for the City in the future. The Plan should guide future zoning decisions of the City.

Policy/Action: Rezoning land for urban development should only occur when it is contiguous with or near existing urban development. Development of land already served by public facilities should occur before development of land for which extension of public facilities is required.

Policy/Action: Coordination of land use plans for the City and neighboring townships should be encouraged. Meetings with township planning commissions will be conducted on a periodic basis to facilitate coordination.

2. GOAL: ENSURE AN ADEQUATE SUPPLY OF LAND FOR ALL TYPES OF RESIDENTIAL DEVELOPMENT.

While detached single-family homes are expected to remain the predominant type of new housing developed in the future, it is important that the Comprehensive Plan and development regulations of the City provide for flexibility in the types of housing developed in the future. The Land Use Plan Map provides land for various densities of residential development in order to permit a variety of choices in housing styles and prices, and to permit market flexibility in responding to demand for various housing products.

Policy/Action: Continue use of Housing Rehabilitation Program to stabilize neighborhoods and maintain a moderately priced housing stock. Federally funded rehabilitation efforts are an important source of affordable housing, particularly for first-time home buyers.

Policy/Action: Encourage stability in residential areas of the City by minimizing intrusions and adverse impacts of incompatible uses. In residential neighborhoods, the stability of housing values and neighborhood quality are sensitive to the impacts of surrounding uses. Although it is not always possible to avoid incompatibilities, the potential adverse impacts of nonresidential uses on residential neighborhoods should be minimized through use of appropriate site design and landscape buffering.

Policy/Action: Provide for the identification and acquisition of land needed for support facilities, such as schools, parks, and public facilities in close proximity to residential areas. The proximity of these services and facilities contributes to the quality of residential areas and creates a sense of community. Periodic review of needs should be conducted with the entities involved with the planning and development of support facilities.

3. GOAL: REDEVELOP THE DOWNTOWN AS A UNIQUE CENTER OF ACTIVITY FOR THE COMMUNITY.

Policy/Action: The City should emphasize the role of the Downtown as a unique office, retail, service, and governmental center. Actions which should be taken to facilitate this policy include:

- Develop the Downtown Riverfront as a focal point of activity
- Improve the visibility of Downtown to create a better awareness of its location. Such improvements could include physical improvements, better signage, changes to street patterns, and improved parking.
- Strengthen characteristics that are unique to Downtown
- Improve Riverfront access to Main Street buildings
- Improve the entrances to the Downtown to:
  - Make the Downtown more visible to the public
  - Create gateways that signify a sense of arrival
- Develop continuity in the physical appearance of Downtown

4. GOAL: PROVIDE LAND FOR NEEDED NEIGHBORHOOD CONVENIENCE COMMERCIAL USES IN LOCATIONS COMPATIBLE WITH AND WITH DESIGN APPROPRIATE FOR RESIDENTIAL AREAS.

Policy/Action: Neighborhood convenience uses should only be permitted at intersections of major or secondary thoroughfares, and on sites where adverse impacts on nearby residential areas can be avoided or minimized through appropriate site design and buffering.

Policy/Action: Neighborhood convenience commercial uses should be designed with access and circulation systems which minimize the number of accesses, thus maintaining the traffic-carrying capacity of major streets.

5. GOAL: ACHIEVE A HIGH-QUALITY IMAGE AND APPEARANCE IN NEW DEVELOPMENT.

Policy/Action: Landscaping of new development should go beyond the use of landscaping to hide undesirable features. Landscaping requirements contained in the zoning ordinance should be modified and expanded to provide a minimum level of quality for all site landscaping, to enhance the appearance of new development, create attractive views from public streets and soften the impact of large parking areas.

Policy/Action: The City should develop design guidelines for new development in the community, emphasizing the impact of proper design on community image and business success.

6. GOAL: EXPAND THE RETAIL ECONOMIC SECTOR IN THE CITY OF MIDLAND TO RETAIN A LARGER SHARE OF RESIDENTS' RETAIL SPENDING.

Policy/Action: The Comprehensive Plan should provide land in suitable areas for expansion of the City's commercial base. Commercial development should be concentrated in the areas shown for such development on the Land Use Plan Map. Sufficient land for commercial use is provided to ensure a competitive land market and a variety of site selection choices.

7. GOAL: PROVIDE LAND TO SUPPORT INDUSTRIAL DIVERSIFICATION OF THE MIDLAND ECONOMY.

Policy/Action: Future industrial development should be located where characteristics such as noise and traffic will not adversely affect residential areas.

Policy/Action: Diversification of the Midland economy should be encouraged by the City and supported by City land-use decisions.

Policy/Action: Additional land for industrial use should be provided in proximity to the Midland Cogeneration Plant.

8. GOAL: MAINTAIN A SYSTEM OF MAJOR STREETS WHICH PROVIDES SAFE AND EFFICIENT TRAFFIC MOVEMENT THROUGHOUT THE CITY, WITHOUT DISRUPTION OF RESIDENTIAL NEIGHBORHOODS.

Policy/Action: Commercial development in a linear pattern with shallow depth along arterial streets should be discouraged. Commercial development should be encouraged as planned centers to avoid the negative visual impacts of strip development and maintain capacity of major thoroughfares through coordination of access and circulation systems.

Policy/Action: Platting of residential lots with individual lot frontage on major streets will be discouraged.

Policy/Action: Access-control regulations will be developed to control the number, location and design of accesses to major streets.

9. GOAL: MAKE IMPROVEMENTS TO THE MAJOR STREET SYSTEM TO MORE EFFECTIVELY SERVE THE TRANSPORTATION NEEDS OF RESIDENTS OF MIDLAND AND THE TRI-CITIES REGION.

Policy/Action: The City should continue to encourage the following improvements to State trunkline highways by the Michigan Department of Transportation:

- A new access ramp from US-10 eastbound to Wackerly Street to provide improved access to Eastman Avenue and longer stacking space for vehicles
- A full-directional interchange at US-10 and Bay City Road to improve traffic access to and from the east side of the City and Williams Township
- Redesign the BR-10/M-20 overpass at Saginaw Road to create a more safe and efficient traffic pattern for this part of the community
- Improve traffic circulation in the vicinity of the Jefferson Avenue overpass of US-10

Policy/Action: Improve north/south circulation on the west side of the City through construction of a major road connection between M-20 on the south and Saginaw Road and the US-10 interchange at Stark Road on the north.

Policy/Action: The City should develop additional traffic circulation options to alleviate the problem in the vicinity of US-10/Wackerly Street/Eastman Avenue. An east-west arterial west of Eastman Avenue north of the US-10 Expressway should be developed.

10. GOAL: PROTECT THE NATURAL FEATURES WHICH CONTRIBUTE TO THE DESIRABLE CHARACTER, APPEARANCE AND IMAGE OF THE CITY OF MIDLAND.

Policy/Action: Encourage preservation of woodlands as an element in the design of new development.

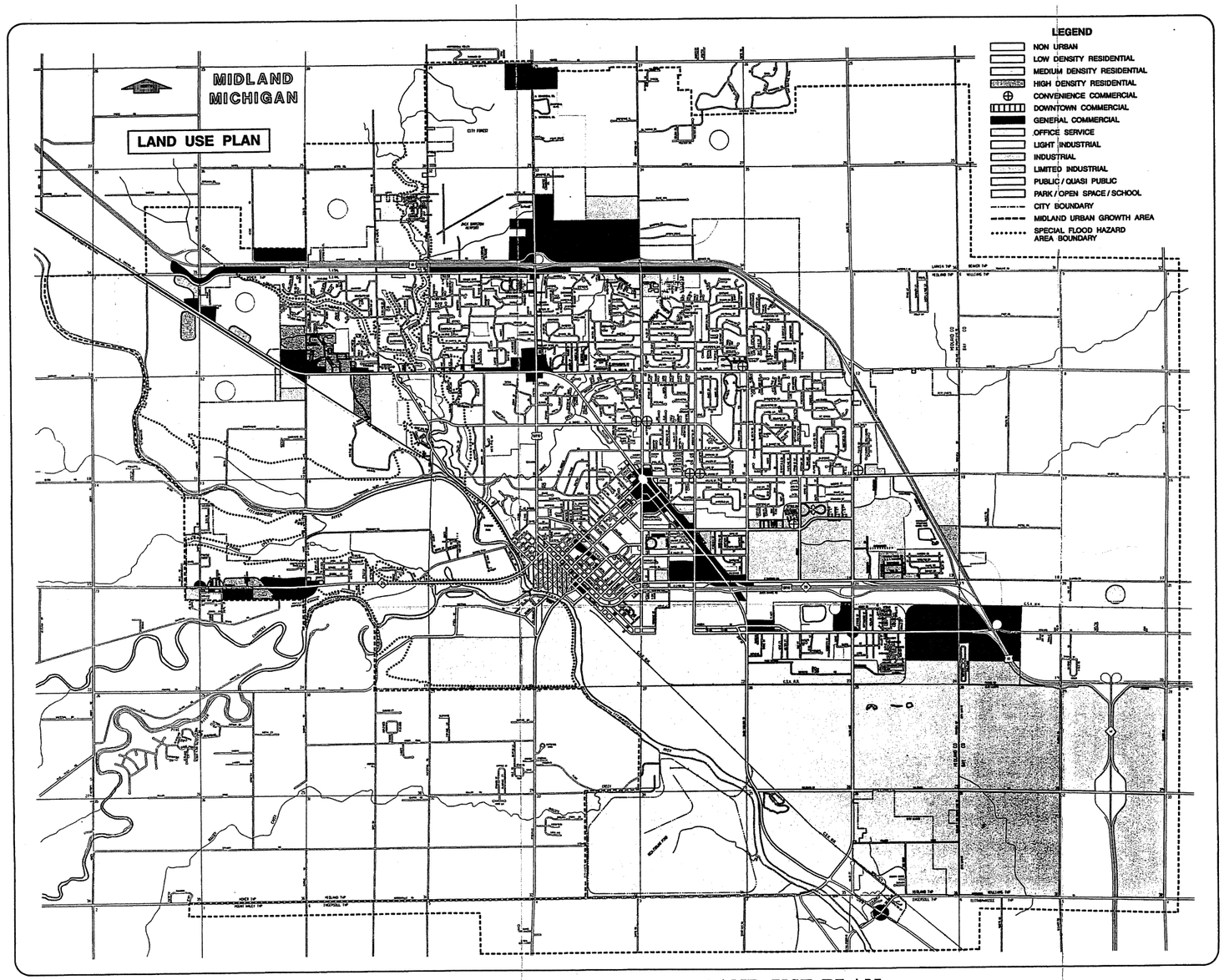
Policy/Action: Discourage intensive development of wetlands and other environmentally sensitive areas. Development standards should be added to the zoning ordinance which ensure that adequate consideration is given to protection of sensitive environmental features.

11. GOAL: PROVIDE PARKS AND OPEN SPACE IN PROXIMITY TO RESIDENTIAL NEIGHBORHOODS

Policy/Action: Encourage development of common open space to preserve environmentally sensitive areas and provide natural areas for the enjoyment of residents.

Policy/Action: Acquire land for neighborhood parks in anticipation of new development and the need for such facilities.

Policy/Action: Develop and implement plans for a pedestrian and bicycle trail system in the City, to provide recreational opportunities for residents and to provide safe non-motorized transportation links between neighborhoods, schools, major park facilities and employment and business centers in the community.



CERTIFICATE:

THIS IS A TRUE AND CORRECT COPY OF THE LAND USE PLAN OF THE CITY OF MIDLAND, ADOPTED BY THE PLANNING COMMISSION OF THE CITY OF MIDLAND ON JUNE 3, 1997 AND JUNE 24, 1997.

James H. Schroeder

JAMES H. SCHROEDER, SECRETARY

PLAN IMPLEMENTATION

The Master Plan identifies goals for the future physical development of the City. The tools listed below represent the primary mechanisms for achieving these goals. It is essential that in utilizing each tool, the Master Plan be considered.

Zoning Ordinance Provisions
The Zoning Ordinance plays a dominant role in implementing the Land Use Plan. Through it, the land in the City is divided into zoning districts. All uses permitted within the different districts, with appropriate restrictions, are clearly defined for each district. It is important that the mapping of zoning districts reflects the recommendations of the Land Use Plan, although minor inconsistencies often exist due to changes in development patterns or zoning practices. It is important that a City's zoning ordinance be updated to reflect new land use concepts and development patterns. The City Council makes the final decision on all zoning matters, with the City Planning Commission playing an important advisory role.

Subdivision Controls
Subdivision controls regulate the division of land in the interest of obtaining orderly and harmonious growth in the community. These regulations can be used to secure good subdivision layout, provide for adequate and coordinated streets, proper sewer and water facilities, and other necessary improvements.

Access Management
The need for costly roadway improvements can be reduced by maintaining the traffic-carrying capacity of existing streets. The number, design, and location of driveways along major roadways affects traffic flow, ease of driving, and accident potential. The use of access-management regulations to ensure proper design and placement of driveways can help limit the number of driveways and encourage access from side streets, service drives, frontage roads, and shared driveways.

Land Acquisition for Public Facilities
As the City grows and expands beyond its current limits, land will be needed for neighborhood parks, new major thoroughfares, schools, and other public services. These needs must be anticipated, and steps must be taken to acquire the land before extensive development makes acquisition difficult and costly.

Long-Range Capital Improvements Program
A Capital Improvement Program lists expenditures for capital expenditures, such as streets and sewers, on a priority basis. Projects which further community-wide goals and objectives should be given a high ranking. The goals and desired development pattern outlined within the Plan should serve as a guide in the planning of future capital expenditures.

Midland Urban Growth Area (MUGA)
The City of Midland's policy of extending utility service to areas within the Midland Urban Growth Area, only upon annexation, helps to control growth on the City's perimeter by making it a part of the City itself. With this policy, the City of Midland inhibits sprawl and the misuse of land, and encourages development to take place in accordance with the Master Plan.

LAND USE PLAN

The Land Use Plan is only for the area of the City of Midland and lands within the Midland Urban Growth Area (MUGA) boundary. The map depicts the desired land use pattern for future development in the community. The boundaries between land use categories are not meant to be precise boundaries, as they appear on the map. The purpose of the Map is to show general land use relationships, not the intended use of every parcel in the community. It should be used as a guide to land use planning and as a tool in planning for future public facility needs.

The major land use categories are as follows:

Non-Urban Development

Land in this category is not expected to experience development of a character or intensity requiring urban services. It is anticipated that lands outside of Midland's Urban Growth Area should remain in this category. However, some land within the MUGA is mapped in the non-urban category, but is expected to be developed to urban densities sometime in the future.

Residential Development

The **Low-Density Residential** category includes traditional detached single-family residential development, as well as newer forms of low-density housing, such as attached single-family condominiums developed at low densities. Density typically does not exceed four dwelling units per acre.

The **Medium-Density Residential** category includes residential development having a density between four and nine dwelling units per acre.

The **High-Density Residential** category includes apartment complexes and permits up to 20 dwelling units per acre.

Commercial Land Use

The **Convenience Commercial** category includes small commercial centers serving the everyday needs of nearby residents. New convenience commercial centers should be considered on a site-specific basis, where development features will not have excessive adverse impacts on surrounding properties.

The **General Commercial** category includes the full range of retail, dining, lodging, and service establishments which serve the entire community and surrounding area.

The **Downtown Commercial** category includes a variety of compatible and mutually supporting uses, including small retail shops, dining establishments, lodging and conference facilities, high-density housing, and riverfront recreational facilities. This area is the same as the Downtown Development Authority District and the Shopping Area Redevelopment Authority District.

Office Service
Land in this category includes professional and business offices, business services, and personal services. This category often serves as a transitional buffer between more intensive commercial and residential areas.

Industrial Land Use

The **Light Industrial** category allows for combining land uses that are both commercial and industrial in nature. External nuisances, such as noise or odors, are minimal.

The **Industrial** category permits all types of industrial and manufacturing uses. These uses, while generating less traffic than Light Industrial, tend to generate more noise, vibration, dirt, odor, and other external nuisances.

The **Limited Industrial** category includes planned industrial centers containing a mix of office, commercial, light industrial, and research uses within a controlled environment. The office and commercial services should provide support facilities for the light industrial uses, incorporating standards governing building size, emissions, noise, and traffic safety.

Public/Quasi Public
This category includes higher education facilities, hospitals, airports, fairgrounds, other governmental facilities, and major cultural and recreational facilities in the community.

Park/Open-Space/School
Included in this category are public and private schools, major community parks, and greenbelts. Existing small parks are included in this category, but most are not shown on the Map. Parks designated by the green circles include approximate areas designated for *future* parks and open space.